

TRANSLATION

PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

(Chapter II of the Patent Cooperation Treaty)

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference X 21/yh/AI	FOR FURTHER ACTION	See Form PCT/IPEA/416
International application No. PCT/EP2005/000761	International filing date (day/month/year) 27.01.2005	Priority date (day/month/year) 02.04.2004
International Patent Classification (IPC) or national classification and IPC B01D65/08, C02F3/12, B01D63/02, B01D63/04		
Applicant KOCH MEMBRANE SYSTEMS GMBH		

1. This report is the international preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 36.

2. This REPORT consists of a total of _____ sheets, including this cover sheet.

3. This report is also accompanied by ANNEXES, comprising:

a. ☒ (sent to the applicant and to the International Bureau) a total of 4 sheets, as follows:

☐ sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications authorized by this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions).

☐ sheets which supersede earlier sheets, but which this Authority considers contain an amendment that goes beyond the disclosure in the international application as filed, as indicated in item 4 of Box No. I and the Supplemental Box.

b. ☐ (sent to the International Bureau only) a total of (indicate type and number of electronic carrier(s)) _____, containing a sequence listing and/or tables related thereto, in computer readable form only, as indicated in the Supplemental Box Relating to Sequence Listing (see Section 802 of the Administrative Instructions).

4. This report contains indications relating to the following items:

☒ Box No. I Basis of the report

☐ Box No. II Priority

☐ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability

☐ Box No. IV Lack of unity of invention

☒ Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

☐ Box No. VI Certain documents cited

☐ Box No. VII Certain defects in the international application

☐ Box No. VIII Certain observations on the international application

Date of submission of the demand	Date of completion of this report
Name and mailing address of the IPEA/EP	Authorized officer
Facsimile No.	Telephone No.

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Box No. I Basis of the report

1. With regard to the language, this report is based on the international application in the language in which it was filed, unless otherwise indicated under this item.
- ☐ This report is based on translations from the original language into the following language _____ which is the language of a translation furnished for the purposes of:
- ☐ international search (Rule 12.3 and 23.1(b))
- ☐ publication of the international application (Rule 12.4)
- ☐ international preliminary examination (Rule 55.2 and/or 55.3)
2. With regard to the elements of the international application, this report is based on *(replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report)*:
- ☐ the international application as originally filed/furnished
- ☒ the description:
- pages 1-7 _____ as originally filed/furnished
- pages* _____ received by this Authority on _____
- pages* _____ received by this Authority on _____
- ☒ the claims:
- nos. _____ as originally filed/furnished
- nos.* _____ as amended (together with any statement) under Article 19
- nos.² 2-9 _____ received by this Authority on 31.10.2005 with telefax
- nos.* 1 _____ received by this Authority on 01.02.2006 with telefax
- ☒ the drawings:
- sheets 1/7-7/7 _____ as originally filed/furnished
- sheets* _____ received by this Authority on _____
- sheets* _____ received by this Authority on _____
- ☐ a sequence listing and/or any related table(s) - see Supplemental Box Relating to Sequence Listing.
3. ☒ The amendments have resulted in the cancellation of:
- ☐ the description, pages _____
- ☒ the claims, nos. 10 _____
- ☐ the drawings, sheets/figs _____
- ☐ the sequence listing (specify): _____
- ☐ any table(s) related to sequence listing (specify): _____
4. ☐ This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).
- ☐ the description, pages _____
- ☐ the claims, nos. _____
- ☐ the drawings, sheets/figs _____
- ☐ the sequence listing (specify): _____
- ☐ any table(s) related to sequence listing (specify): _____

* If item 4 applies, some or all of those sheets may be marked "superseded."

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Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability:
citations and explanations supporting such statement

1. Statement

Novelty (N)	Claims <u>1-9</u>	YES
	Claims _____	NO
Inventive step (IS)	Claims <u>1-9</u>	YES
	Claims _____	NO
Industrial applicability (IA)	Claims <u>1-9</u>	YES
	Claims _____	NO

2. Citations and explanations (Rule 70.7)

1 Reference is made to the following documents:

- D1: US 2003/127389 A1 (RABIE HAMID ET AL) 10 July 2003 (2003-07-10)
- D2: PATENT ABSTRACTS OF JAPAN vol. 1995, no. 10, 30 November 1995 (1995-11-30) & JP 07 185271 A (KURITA WATER IND LTD), 25 July 1995 (1995-07-25)
- D4: PATENT ABSTRACTS OF JAPAN vol. 018, no. 381 (C-1226), 18 July 1994 (1994-07-18) & JP 06 106167 A (KUBOTA CORP), 19 April 1994 (1994-04-19)
- D5: PATENT ABSTRACTS OF JAPAN vol. 2000, no. 06, 22 September 2000 (2000-09-22) & JP 2000 070936 A (IBIDEN ENGINEERING KK; IBIDEN CO LTD), 7 March 2000 (2000-03-07)

2 The amendments meet the requirements of PCT Article 34(2)(b).

3 Novelty

According to claim 1, a method for aerating submerged membrane modules is defined by the following features:

- i) supplying a gas from a common source to each module;
- ii) valves in the supply to each module;

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- iii) successive individual aeration of the modules by switching the valves, wherein
- iv) when switching over takes place in a specific time period, two modules are together
- v) aerated with steady-state partial air flows and wherein
- vi) the valves can only assume either the open position or the shut-off position.

Installations and methods for aerating submerged membrane modules are known from documents D1, D2, D4 and D5. Since none of the cited references discloses all of features i-vi, the present application meets the requirements of PCT Article 33(2).

4 Inventive step

- 4.1 The closest prior art, D1, discloses an aerating method with a series of aerating strands arranged in parallel (figure 4c, ref. 240, 251), which are for example switched by solenoid valves ("solenoid", §[0051]), i.e. a valve according to feature vi, so all the strands are alternately subjected to a high aerating rate (Rh). In this case, the open and shut-off times of the valves are preferably controlled in such a way that one strand is made to begin closing by the valve before another strand has been opened completely (§[0054]). This produces three sub-cycles (as evident for example from figure 3 or 4E). By contrast with claim 1 of the application, however, D1 does not disclose steady-state partial air flows in the switching cycle (feature v).

The problem addressed is that of realizing a careful two-stage switching process which at any

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time uses defined air flows and the length of which can be optimally set. The control method should also be as simple as possible.

The solution, comprising the use of simple on-off valves and a steady-state transitional region, is not suggested in an obvious way to a person skilled in the art by D1.

Although the installation disclosed in D1 is to be regarded as suitable in principle for realizing such a process (see above), all the disclosed switching operations (cf. figures 3, 4e, 4f) are discontinuous. Although states in which a number of strands are aerated are not ruled out (cf. §[0048]: "less than one half of R_h "), this is then not the second, transitional cycle.

Moreover, by contrast with individual regulation of the air flows of individual strands as in D1, the process according to the invention requires only a minimal regulating effort (merely on-off switching required).

The subject matter of claim 1 and of dependent claims 2-9 therefore meets the requirements of PCT Article 33(3).